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Submitted herewith for filing under 35 USC 111 and 37 CFR 1.53 is the ☐ Design ☒ Utility patent application of:

INVENTOR: Ching-Shen HORNG

ENTITLED: POSITIONING DEVICES FOR A SENSOR ELEMENT OF A MINIATURE FAN

Enclosed are:

- ☒ 8 page(s) of written description, claims and abstract.
- ☒ 3 sheet(s) of drawings.
- ☐ An assignment of the invention to
- ☒ Executed declaration of the inventor(s).
- ☐ A certified copy of a _____ application. Priority is claimed if not already of record.
- ☒ A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27.
- ☐ Preliminary amendment.
- ☐

The filing fee has been calculated as shown below:

ITEM AS FILED		# EXTRA	SMALL ENTITY	FULL FEE
Basic Fee			<input checked="" type="checkbox"/> Utility \$395. <input type="checkbox"/> Design \$165.	<input type="checkbox"/> Utility \$790. <input type="checkbox"/> Design \$330.
Total Claims	7 - 20 =	¹	× \$ 11 =	× \$ 22 =
Independent Claims	1 - 3 =	²	× \$ 41 =	× \$ 82 =
<input type="checkbox"/> Multiple Dependent Claims in Proper Form Presented			+ \$135 =	+ \$270 =
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- ☒ The Commissioner is hereby authorized to charge any additional fees associated with this communication, including patent application filing fees and processing fees under 37 CFR 1.16 and 37 CFR 1.17 or credit any overpayment to Deposit Account Number 02-0200. A duplicate copy of this paper is enclosed.

BACON & THOMAS
625 SLATERS LANE - FOURTH FLOOR
ALEXANDRIA, VIRGINIA 22314
(703) 683-0500

DATE: 21 October 1997

Respectfully submitted,



EUGENE MAR
Attorney for Applicant
Registration Number: 25,893

1 Positioning Devices for a Sensor Element of a Miniature Fan

2 Background of the Invention

3 1. Field of the Invention

4 The present invention relates to positioning devices
5 for a sensor element of a miniature fan.

6 2. Description of the Related Art

7 A wide variety of miniature fans have heretofore been
8 provided. For example, U.S. Patent No. 5,492,458 discloses an
9 electric fan including a housing having a hub formed in the
10 center, a shaft having one end force-fitted in the hub and
11 having an annular flange formed in the other end, two polar
12 plates force-fitted on the shaft, and a stator disposed
13 between the polar plates. Nevertheless, the starting effect
14 of the motor of such an electric fan is not satisfactory as a
15 sensor element on the circuit board for starting cannot be
16 accurately aligned with an end edge of the polar plates. The
17 present invention is intended to provide a positioning device
18 for the sensor element which mitigates and/or obviates the
19 above problems.

20 Summary of the Invention

21 It is a primary object of the present invention to
22 provide a positioning device which allows the motor of a
23 miniature fan to be easily activated.

24 A positioning device for a miniature fan in accordance
25 with the present invention comprises a coil seat including a
26 plurality of annularly spaced poles each having a stem and an

1 arcuate section. Each stem has a winding wound therearound,
2 and each arcuate section has a first end edge and a second
3 end edge. A circuit board is securely connected to the coil
4 seat and includes a sensor element mounted thereon. The
5 sensor element is located on a vertical line extending from
6 one of the first end edge and the second end edge of one of
7 the poles.

8 The pole having the first end edge or the second end
9 edge aligned with the sensor element has a first mark means
10 formed thereon, and the sensor element has a second mark
11 means formed thereon which is aligned with the first mark
12 means when mounting the sensor element onto the circuit board
13 to assure that the sensor element is located on the vertical
14 line.

15 The circuit board may include a notch defined therein
16 for securely receiving the sensor element. The circuit board
17 includes a third mark means aligned with the second mark
18 means to provide a reference for mounting the sensor element
19 in the notch by aligning with the second mark means of the
20 sensor element with the third mark means.

21 Other objects, advantages, and novel features of the
22 invention will become more apparent from the following
23 detailed description when taken in conjunction with the
24 accompanying drawings.

25 Brief Description of the Drawings

26 Fig. 1 is an exploded perspective view of a

1 positioning device for miniature fans in accordance with the
2 present invention;

3 Fig. 2 is a schematic side view of the positioning
4 device in accordance with the present invention;

5 Fig. 3 is an exploded perspective view of a second
6 embodiment of the positioning device in accordance with the
7 present invention;

8 Fig. 4 is an exploded perspective view illustrating a
9 third embodiment of the positioning device in accordance with
10 the present invention; and

11 Fig. 5 is a schematic side view of the third
12 embodiment of the positioning device.

13 Description of the Preferred Embodiments

14 Referring to the drawings and initially to Figs. 1 and
15 2, a positioning device for miniature fans in accordance with
16 the present invention generally includes a coil seat 1 and a
17 circuit board 2. The coil seat 1 includes a number of
18 annularly spaced poles 11 each having a stem 12 and an
19 arcuate section 18 with a first end edge 13 and a second end
20 edge 14. The stem 12 of each pole 11 includes a winding 14
21 wound therearound. The coil seat 1 includes a central opening
22 15 for receiving an axle 21 formed on a side of the circuit
23 board 2.

24 The circuit board 2 includes a plurality of electric
25 elements 22 for controlling rotation of the fan, which is
26 conventional and therefore not described in detail. A sensor

1 element 23 is mounted on the circuit board 2 in a manner that
2 the first end edge 13 of one of the poles 11 aligns with the
3 sensor element 23. For easy assembly, the first end edge 13
4 has a first mark means 16 formed thereon, and the sensor
5 element 23 includes a second mark means 24 formed thereon
6 such that when mounting the sensor element 23 on the circuit
7 board 2 (the circuit board 2 has been engaged with the coil
8 seat 1), the second mark 24 is aligned with a first mark 16
9 formed on the arcuate section 18 adjacent to the first end
10 edge 13 to assure alignment of the sensor element 23 and the
11 first end edge 13 in a vertical direction. The mark means 16
12 and 24 may be lines, dots, etc. By such an arrangement, the
13 sensor element 23 on the circuit board 2 is accurately
14 aligned with the first end edge 13 of one of the poles 11 to
15 thereby provide a reliable starting of a rotor of the motor
16 (not shown), which is conventional and therefore not further
17 described.

18 Fig. 3 illustrates a modified embodiment of the
19 invention, wherein the circuit board 2 includes a notch 25
20 defined therein for receiving the sensor element 23 with the
21 second mark 24 formed thereon. In addition, a number of pin
22 holes 26 are defined in the circuit board 2 adjacent to the
23 notch 25 for receiving the pins (not shown) of the sensor
24 element 23, which is conventional and therefore not further
25 described. The circuit board 2 includes a third mark means 27
26 formed adjacent to the notch 25. The mark means 16 and 24,

1 and 27 may be lines, dots, etc. In assembly, the third mark
2 means 27, which is already in alignment with the first mark
3 means 16, provides a reference for aligning with the second
4 mark means 24 such that the sensor element 23 is in alignment
5 with the first end edge 13 of one of the poles 11 to thereby
6 provide a reliable activation of the rotor of the motor.

7 Figs. 4 and 5 illustrate a third embodiment of the
8 invention, in which the second end edge 14 of one of the
9 poles 11 aligns with the sensor element 23, while a first
10 mark means 16 is provided on the arcuate section 18 adjacent
11 to the rear end edge 14 to provide a reference for mounting
12 the sensor element 23 onto the circuit board 2.

13 Conclusively, the sensor element 23 is located on a
14 vertical line extending from the end edge 13, 14 of one of
15 the poles 11 along a direction parallel to a longitudinal
16 axis "X" of the coil seat 1 such that the rotor may be
17 reliably activated to rotate.

18 Although the invention has been explained in relation
19 to its preferred embodiment, it is to be understood that many
20 other possible modifications and variations can be made
21 without departing from the spirit and scope of the invention
22 as hereinafter claimed.
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1 What is claimed is:

2 1. A positioning device for a miniature fan, comprising:

3 a coil seat including a plurality of annularly spaced
4 poles each having a stem and an arcuate section, each said
5 stem having a winding wound therearound, each said arcuate
6 section having a first end edge and a second end edge, and

7 a circuit board securely connected to the coil seat
8 and including a sensor element mounted thereon, the sensor
9 element being located on a vertical line extending from one
10 of the first end edge and the second end edge of one of the
11 poles.

12 2. The positioning device according to claim 1, wherein the
13 pole having the first end edge aligned with the sensor
14 element has a first mark means formed thereon, and the sensor
15 element has a second mark means formed thereon which is
16 aligned with the first mark means when mounting the sensor
17 element onto the circuit board to assure that the sensor
18 element is located on the vertical line.

19 3. The positioning device according to claim 2, wherein the
20 circuit board includes a notch defined therein for securely
21 receiving the sensor element.

22 4. The positioning device according to claim 3, wherein the
23 circuit board includes a third mark means aligned with the
24 second mark means to provide a reference for mounting the
25 sensor element in the notch by aligning with the second mark
26 means of the sensor element with the third mark means.

1 5. The positioning device according to claim 1, wherein the
2 pole having second first end edge aligned with the sensor
3 element has a first mark means formed thereon, and the sensor
4 element has a second mark means formed thereon which is
5 aligned with the first mark means when mounting the sensor
6 element onto the circuit board to assure that the sensor
7 element is located on the vertical line.

8 6. The positioning device according to claim 5, wherein the
9 circuit board includes a notch defined therein for securely
10 receiving the sensor element.

11 7. The positioning device according to claim 6, wherein the
12 circuit board includes a third mark means aligned with the
13 second mark means to provide a reference for mounting the
14 sensor element in the notch by aligning with the second mark
15 means of the sensor element with the third mark means.
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Abstract of the Disclosure

A positioning device for a miniature fan includes a coil seat including a number of annularly spaced poles each having a stem and an arcuate section. Each stem has a winding wound therearound, and each arcuate section has a first end edge and a second end edge. A circuit board is securely connected to the coil seat and includes a sensor element mounted thereon. The sensor element is located on a vertical line extending from one of the first end edge and the second end edge of one of the poles.

DECLARATION FOR PATENT APPLICATION AND APPOINTMENT OF ATTORNEY

As a below named inventor, I hereby declare that my residence, post office address and citizenship are as stated below next to my name; I believe that I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention (Design, if applicable) entitled:

Positioning Devices for a Sensor Element of a Miniature Fan

the specification of which (check one):

☒ is attached hereto.

☐ was filed on:

and (if applicable) was amended on:

as Application Serial No.:

☐ was filed on:

and (if applicable) was amended on:

as International Application (PCT) No.:

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment(s) referred to above. I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations*, §1.56. I hereby claim foreign priority benefits under *Title 35, United States Code* §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

PRIOR FOREIGN APPLICATION(S)			PRIORITY CLAIMED	
Number	Country	Day/Month/Year Filed	Yes	No
86216102	Taiwan, Republic of China	20/09/1997		X

I hereby claim the benefit under *Title 35, United States Code*, §120 of any United States application(s) or PCT international application(s) designating The United States of America listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of *Title 35, United States Code*, §112, I acknowledge the duty to disclose information which is material to patentability as defined in *Title 37, Code of Federal Regulations*, §1.56 which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

Application Number	Filing Date	Status - Patented, Pending or Abandoned

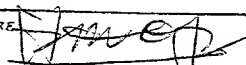
I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

POWER OF ATTORNEY: I (We) hereby appoint as my (our) attorneys, with full powers of substitution and revocation, to prosecute this application and transact all business in the Patent and Trademark Office connected therewith: J. Ernest Kenney, Reg. No. 19,179; Eugene Mar, Reg. No. 25,893; Richard E. Fichter, Reg. No. 26,382; Charles R. Wolfe, Jr., Reg. No. 28,680; Thomas J. Moore, Reg. No. 28,974; David E. Dougherty, Reg. No. 19,576; Bruce H. Troxell, Reg. No. 26,592, and

I(we) authorize my(our) attorneys to accept and follow instructions from FIVE CONTINENTS INTERNATIONAL PTO regarding any matter related to the preparation, examination, grant and maintenance of this application, any continuation, continuation-in-part or divisional based thereon, and any patent resulting therefrom, until I(we) or my(our) assigns withdraw this authorization in writing.

Send correspondence to: BACON & THOMAS
625 Slaters Lane - 4th Floor
Alexandria, VA 22314

Telephone Calls to:
(703) 683-0500

Full Name of First or Sole Inventor Ching-Shen HORNG	Citizenship Taiwan, Republic of China
Residence Address No. 3, Lane 45, Yi-Yung Road, Kaohsiung, Taiwan, R.O.C.	Post Office Address <input checked="" type="checkbox"/> Same as Residence
DATE October 9, 1997	SIGNATURE 

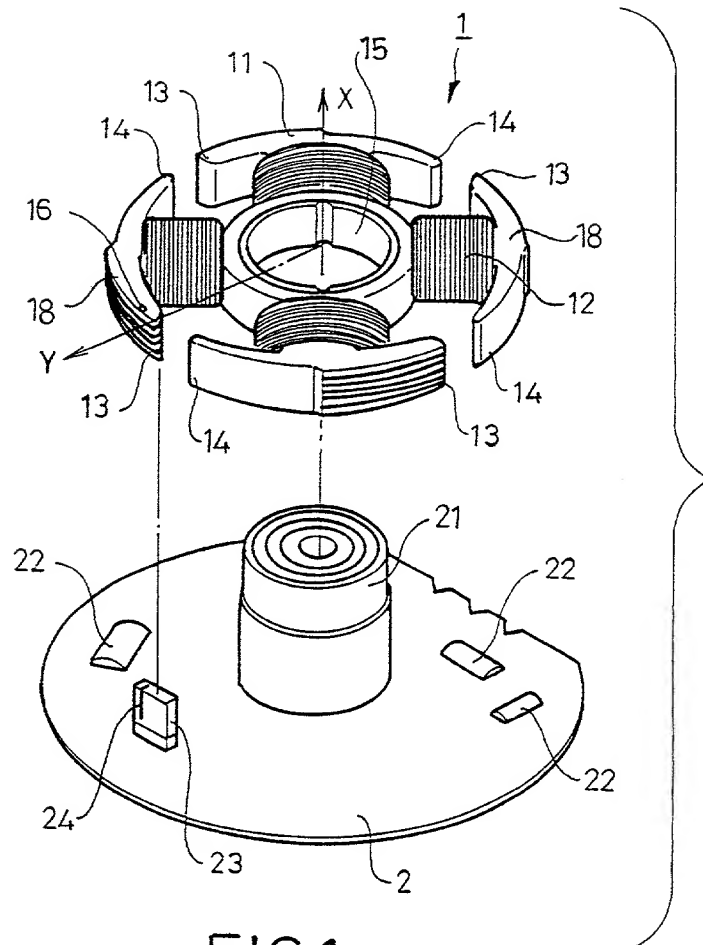


FIG.1

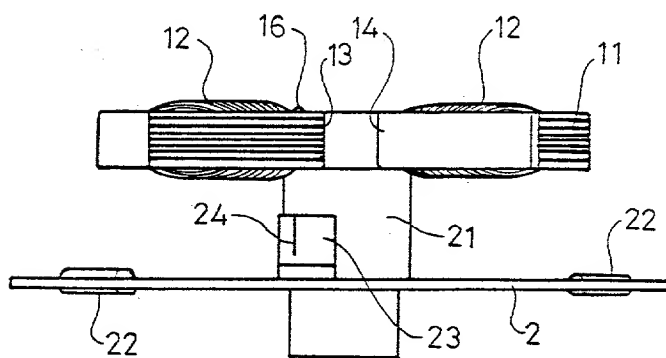


FIG.2

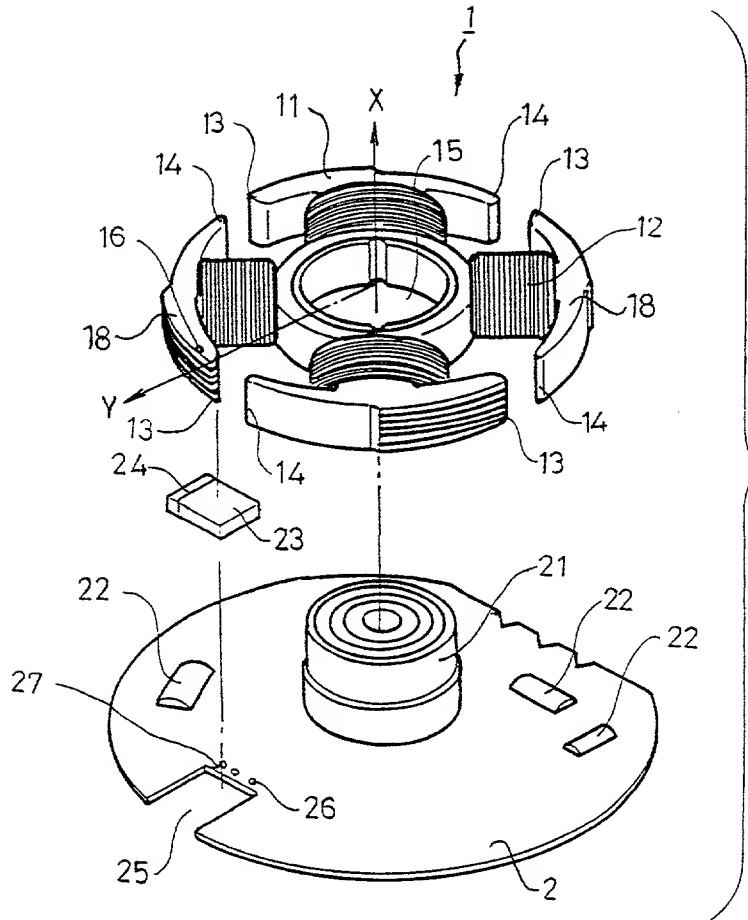


FIG.3

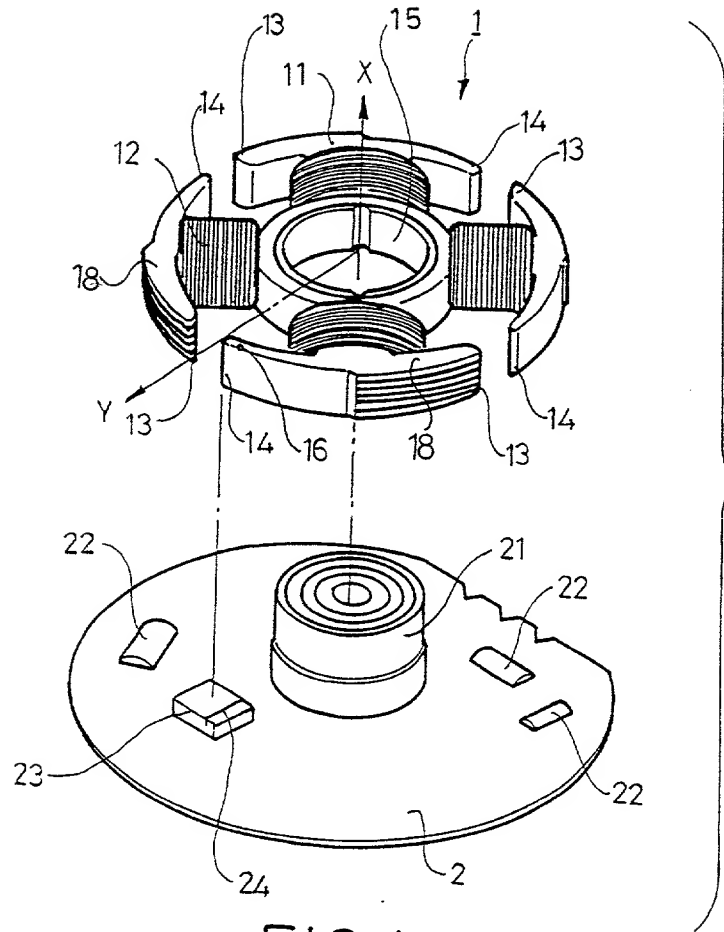


FIG. 4

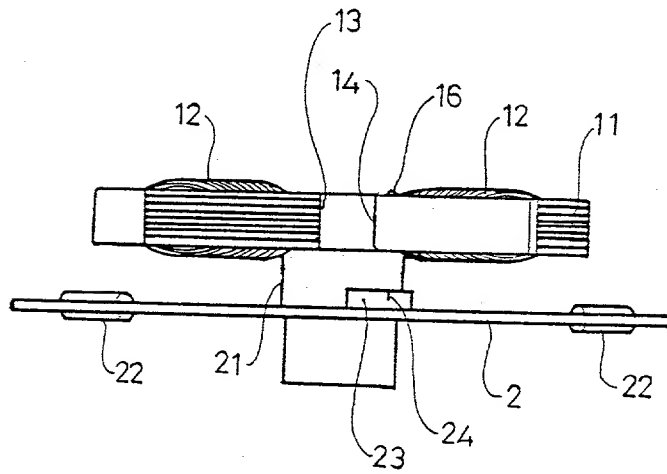


FIG. 5

VERIFIED STATEMENT (DECLARATION) BY AN INDEPENDENT INVENTOR CLAIMING SMALL ENTITY STATUS UNDER 37 CFR 1.9(f) AND 1.27(b)

APPLICANT OR PATENTEE: Ching-Shen HORNG

DOCKET #:

SERIAL OR PATENT NUMBER:

GROUP ART UNIT:

FILED OR ISSUED:

EXAMINER:

TITLE:

Positioning Devices for a Sensor Element of a Miniature Fan

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office with regard to the matter described in:

- ☒ The specification filed herewith, with the title as listed above.
☐ The patent application identified above.
☐ The PCT international patent application identified above.
☐ The patent number identified above.

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license any rights in the invention to any person who could not be classified as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:

- ☒ no such person, concern or organization.
☐ each such person, concern or organization listed below. Note: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities (37 CFR 1.27).

FULL NAME	<input type="checkbox"/> Individual <input type="checkbox"/> Small Business Concern <input type="checkbox"/> Nonprofit Organization
ADDRESS	
FULL NAME	<input type="checkbox"/> Individual <input type="checkbox"/> Small Business Concern <input type="checkbox"/> Nonprofit Organization
ADDRESS	

☐ See attached sheet for additional person(s), concern(s) or organization(s).

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine, or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which the verified statement is directed.

	Inventor 1	Inventor 2	Inventor 3
Name	Ching-Shen HORNG		
Date	October 9, 1997		
Signature	